Distributed Resources:
Report and Review of Comments to the Illinois Commerce Commission Electric Policy Committee*

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Commission Electric Policy Committee

Introduction

On October 27, 1999 Commissioner Harvill requested comments to the Electric Policy Committee on distributed resources and the impact or potential impact these resources may have on the Illinois electric market.[1] The questions addressed a broad range of issues that, in some instances, are just beginning to receive attention around the country. Comments were received from the following parties: AmerenCIPS and AmerenUE (Ameren), Caterpillar Inc. (Caterpillar), Corn Products International Inc. (Corn Products), Cummins Onan Northern and NewEnergy Inc.(CONI & NE), Edison Electric Institute (EEI), Enron North America and Enron Energy Services (Enron), Environmental Law and Policy Center (ELPC), Illinois Power Company (IPC), Metropolitan Water Reclamation District of Greater Chicago (MWD), MidAmerican Energy Company (MEC), Nicor, Peoples Energy (Peoples), Staff of the Illinois Commerce Commission (Staff) and Unicom Corporation (Unicom).

Some of the parties provided a background narrative in an attempt to motivate the answers provided. Such a background is necessary as many of the questions assumed a certain level of familiarity with the issues on the part of the reader. It is not the intent here to summarize the background material provided by the parties, but rather to provide a common background to begin the discussion of the issues relating to distributed resources.

Background

Distributed resources are currently attracting more attention than in the past for three reasons. First, utility restructuring has placed a focus on customer energy needs. As more entities crowd into the market, new and innovative solutions are being deployed to meet these needs, including DR. Second, to the extent relative electricity prices have decreased as a result of restructuring this provides a stimulant for electricity demand growth. Further, the US is in the midst of its longest period of economic growth in its history. Both of these factors have had impacts on the need for additional system capacity. Expanding capacity needs along with pressure to maintain costs has lead many to the conclusion that DR can play a role in meeting tomorrow's energy needs. Last, technological change has provided a menu of options for DR. As some of the DR products enter a more mature stage in their life-cycle, units costs have decreased as production efficiencies have increased making some DR solutions attractive alternatives.

<u>What are Distributed Resources?</u>

The concept of distributed resources is not new to the electric industry. For various reasons and for many years customers, independent power producers, utility affiliates and utilities have installed DR in Illinois and around the country. Much of this involved generation such

[1] The term "distributed resources" (DR) is used in this report to signify a broad range of both supply and demand side resources. The terms "distributed generation" (DG) or "local generation" are used synonymously and signify only electrical generation facilities. Generally, the following discussion will concern DG where parties comments have limited their discussion to DG and DR where the comments have been applied in a broader sense.

as reciprocating engines and gas turbines. Staff indicates that, as of the end of 1998, non-utility generation, including small power production facilities, represented over eleven percent of net generation in the US.[2] To put this into perspective, a recent report estimates that over 60,000 MW of reciprocating engines and small gas turbines are installed in North America.[3] As an example of the potential for growth in the application of these technologies, the report suggests that reciprocating engines and gas turbines to meet back-up, base-load and peaking requirements will continue to grow nationally at seven, eleven and seventeen percent per annum, respectively.[4] Additionally, technologies such as micro-turbines, fuel cells, photovoltaics and wind turbines have recently become, or will soon become, commercially viable.

Some of the technologies noted above are based on a combustion process whereas others use alternative means of producing electricity. Micro-turbines and small gas turbines (SGT) are derivatives of the defense and aircraft industries. Both work on the same basic principle of converting thermal energy into mechanical energy via high pressure hot gas expanding through a turbine. SGTs range in size from approximately 500 kW to 15,000 kW, while micro-turbines range from 25kW to250kW.

Fuel cells operate on the principle of converting chemical energy to electrical energy. Although fuel cells are new to the distributed power generation market, the technology has been around for 150 years and has been used by NASA on board space missions for the past 30 years. Fuel cells convert fuel gas (such as hydrogen, natural gas, vaporized LPG) and air electrochemically into electrical and thermal energy.[5] Fuel cells typically produce very small amounts of NO_X and only about half the CO_2 of traditional generation sources.[6] While each individual cell producers very low voltage, the cells are generally stacked together and electrically connected in series to produce useful levels of voltage. There are two general technological paths fuel cells are following: high temperature (e.g., solid oxide and molten carbonate cells) and low temperature (e.g., phosphoric acid and proton exchange membrane cells). Fuel cells can range from 7kW to 225kW.

Photovoltaics convert sunlight into direct current (DC) electricity and into alternating current (AC) via a power inverter. Photovoltaics generally range from 10kW to 5,000kW. Wind turbines convert the wind's energy, via a blade mounted either horizontally or vertically, to electricity. Typical wind turbines range from 10kW to 750kW. "Windparks" may produce many megawatts through the placement of scores of individual wind turbines in a concentrated area. Internal combustion engine technology is derived from the automobile industry. Oil-fueled diesel cycle engines and dual fueled (natural gas and oil), compression ignition engines, and natural gas fueled, spark ignition, internal combustion

[2] Non-utility generation (NUG) is often associated with the Public Utility Regulatory Policy Act (PURPA) of 1978, which promoted the use of heat/steam and renewable fuel sources by so-called "qualifying facilities" or QFs.
[3] *Distributed Generation: System Interfaces*, Arthur D. Little Inc., White Paper, Cambridge, MA, 1999, p. 2. For reference, peak demand in MAIN was just less than 50,000 MW in 1999. ComEd's peak demand in 1999 was just over 20,000 MW.
[4] Id.
[5] The basic reaction takes hydrogen from the fuel source and oxygen from the air to produce electricity and water.
[6] However, there may be other environmental issues related to the disposal of used fuels cells.

engines have been deployed as distributed resources. Internal combustion resources are generally in the 100kW to 3,000kW range.

The above discussion provides an overview of what can be termed "distributed generation" or local generation. However, other resources that either store electric energy or manage electric load in order to control electricity usage at peak times could also be considered distributed resources.

Uses and Benefits of DR

DR can be installed by the end-user as an alternative to electric service from the host utility, or it can be used in combination with service from the host utility. DG can also be installed on the grid-side as either a merchant operation or to provide support for the distribution system as a potentially cost-effective alternative to utility-owned upgrades of the distribution system. DG has attracted attention for the various benefits alleged by its proponents. For example, in a recent filing ComEd noted that "distributed resources, both demand-side and supply side resources, have become a focus of the industry due to their potential to enhance distribution system reliability."[7] However, surely one major force driving the interest in local small scale generation is the project economics. As small scale generation technology has advanced, costs[8] are, and have been, decreasing to a range where they are becoming competitive vis-a-vis peak energy prices and even base-load energy prices.[9] Additionally, for those customers that are very sensitive to electric reliability, local generation is becoming competitive with utility central station generation.[10] But beyond the project economics, local generation technologies also have the potential to mitigate harmful environmental consequences of large central station generation.[11] Furthermore, expensive and often politically unpopular transmission and distribution investment may be avoided with the strategic use of distributed resources.[12] Distributed resources also represent another means by which customers can access competitive supply options, adding to the menu of choices available.

However, many of the purported benefits of DR are project and site specific. For example, in order to avoid costly and politically unpopular T&D upgrades, the distributed generation must be placed in the correct position on the gird. Simply placing a generator anywhere on

7 *Description of Experimental Billing or Pricing Program Pursuant to 220 ILCS 5/16-106: Wind and Photovoltaic Generation Pricing Experiment*, filed by ComEd with the Illinois Commerce Commission on February 7, 2000.

8 Including costs associated with reliability concerns.

9 For example, GE will be testing fuel cells in the residential market this summer, expecting that by 2001 such systems will become generally available. GE also expects to begin marketing small commercial units by 2002. PLUG POWER FUEL CELLS TO BE TESTED IN NJ, GEORGIA—Reuters, 12/02/1999.

10 This can result from higher levels of new investment to provide higher quality service or customers unwilling or unable to accept lower quality service even at lower prices.

11 Even DR technologies that use some form of combustion may still provide environmental benefits due to avoidance of electricity losses in the transmission and distribution system.

12 One report estimates that between $800 million and $2.5 billion per year of national T&D investment has the potential to be diverted to distributed resources. These figures represent the potential for DG, on an annual basis, to completely replace T&D investment that is solely related to load. This number does not represent investment that is used to replace damaged or worn-out equipment or improve reliability. For reference, national T&D investment was between $12 and $15 billion, annually, for the past decade. *Helping Distributed Resources Happen: A Blueprint for Regulators, Advocates, and Distribution Companies*, Fred Gordon, Joe Chaisson and Dave Andrus, Dec. 1998.

the grid may not avoid costs and, in fact, may increase costs. Therefore one economic issue that remains is the appropriation and allocation of such benefits. It may be difficult for third-party entrants to reflect the full benefits of local generation in the package offered to end-use consumers. While the theoretical benefits of DR appear to be substantial, there do remain issues related to deploying such resources that may diminish the net benefit of deploying DR.

Further, distributed resources have existed for years on the T&D system, with no apparent problems. However, as the electric market becomes more liberalized, more units are likely to be added to the system.[13] As utility distribution systems are not necessarily designed to facilitate local generation connection and use, issues may arise concerning worker safety, system reliability and facility maintenance. Furthermore, while some distributed generation may improve environmental quality, local generation has the potential to degrade the environment, since local generation can be valuable in highly congested, and possibility highly polluted, areas such as cities. Other potential drawbacks or costs, such as customer-side safety issues, local citing, and facility upgrades (along with cost recovery) may arise as deployment of these services increases.

Policy Issues

Generally, the following main areas are often identified as policy issues related to the deployment or distributed resources.[14]

- Interconnection
  What changes to current interconnection procedures, if any, need to be modified?
- Stand-by/backup charges/rate design
  What aspects of utility rate design or level for standby/backup charges need modification, if any?
- Grid-side or system benefits.
  Should external benefits of DR be monetized and allocated in some manner? If so, how would such a process work? Should certain DR applications be subsidized or encouraged by government?
- System Interfaces
  Should DR be allowed to interface with markets and grid operations? Do current grid operations disadvantage small-scale local generation?
- Incumbent delivery services utility participation in DR market
  Should incumbent delivery services companies be allowed to, required to or prohibited from participating in the DR market? Are there inherent incentive

[13] Unicom has installed five micro-turbines in ComEd's service territory and has plans to install 200 to300 in the next year. Comments of Unicom (Introduction).

[14] This list summarizes the policy implications of the Committee's questions (*See* Appendix I). A list very similar to this one can be found in *Distributed Generation: Policy Framework for Regulators*, An Arthur D. Little White Paper, Cambridge, MA. 1999.

problems with participation of the delivery services utility in the DR market? Are there market power issues?

- Market design

  How does DR fit into the overall market design?

- Siting and Certificates of Public Convenience

  What aspects of the facility siting requirements discourage the use of cost-effective DR, if any?

Many of the most important issues relate to the incentive structure inherent in the regulation of public utilities.[15] Also of clear importance is the economic impact of the design of the market as it relates to DR. If DR has economic value to society that is higher than the economic value to the incumbent utility there may be a mismatch of societal aims and the private aims of the local utility. A simple example might entail the placing of distributed resources by a customer in a congested or potentially congested area. When all the costs are taken into account, it is possible that using DR would lower total societal costs relative to the utility upgrading or expanding transmission or distribution facilities. However, the incentive for the utility is to increase sales over its wires to increase profits.[16] Thus a customer interested in placing a DR in that area may receive an offer from the utility that would beat the customer's private cost of installing the DR (as the utility will take only its private costs into account).[17] Since both parties to this transaction have only their private interests in mind the deal will be completed. However, it is possible that by lowering the price paid by the consumer <u>and</u> eliminating a local source of supply actually exacerbates the congestion problem. All consumers are impacted by the increase in congestion costs, but potentially of more importance are the costs associated with the increased likelihood of equipment failures in the congested areas. While this is a hypothetical situation, it illustrates the potential for private costs and social costs to diverge in a manner that could have tremendous impacts beyond utility customers.[18] Yet a simple solution to such a problem is not evident. It is not clear that regulators (or even the utility) would have sufficient information to calculate the "real" cost of these actions. If the costs calculations are wrong and policies are implemented based on those calculations, total cost could also be increased.

When approaching these issues it may be useful to keep in mind the goals of public policy. Within the context of the restructured market place, some goals for public policy have changed. For example, the Illinois Commerce Commission has been charged with *promoting* a competitive market for electricity, both at the wholesale and retail levels. New and complex issues arise in the context of competitive markets. As the Midwest moves toward an independent transmission operator (or some version of an ISO) issues related to congestion management and competitive commodity markets come to the forefront. It is

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15 *See e.g., Profits and Progress Through Distributed Resources*, Regulatory Assistance Project, November, 1999 for a review of the incentive structure as it relates to DR.

16 Id.

17 This may include the discounted cost of future T&D upgrades and any liability the utility might face as a result of failure of its system. However, unless those costs meet or exceed the total societal costs, the example holds. Further, since T&D prices are averaged, it is unlikely that the customer will face the true marginal cost of its action.

18 An example might be a downtown area, such as Chicago's Loop, where the loss of load potentially impacts businesses around the world.

unclear that the MISO would have any different incentives for transmission planning than do the current transmission owners.

Yet many of the traditional goals remain. Safety and reliability are of high import as a stated goal. Maintaining the viability of the utility also remains as a stated goal.[19] Other more or less explicit goals remain such just and reasonable rates (for non-competitive services), consumer protection, environmental awareness and effective, efficient and fair regulation.

<u>States' Response to DR Issues</u>

Local or distributed generation has recently become an issue of interest in many jurisdictions.[20] Policymakers have decided that some issues need to be addresses in a timely manner while others can be addressed over time. Interconnection has been an issues of concentration for some policymakers as they have determined such technical issues are the cornerstone for subsequent discussions.

Some states such as Texas, when concerned with the availability of supply following record summer demand, approved a set of interconnection rules and procedures to remove existing barriers to interconnection of small scale generation. Texas has adopted a standardized interconnection application and agreement and rules for the utility's side of the interconnection process.[21]

New York approached this issues through a series of informal workshops, with a final staff report pending adoption by the New York Public Service Commission. New York has also addressed issues relating to connection of photovoltaic technologies to the grid in the residential market. Net metering, a process by which consumers are compensated by the host utility for the use of such technologies, has been employed in New York to encourage such applications.[22]

California is addressing these issues as a natural outgrowth of electric restructuring.[23] California has bifurcated its investigation into distributed generation and distribution competition. Distributed generation issues, such as interconnection issues, will be addressed immediately through a rulemaking, while the CPUC staff was directed to address distribution competition issues through a study and report. The CPUC is taking a very broad approach to the issues related to DR. In addition to interconnection issues, the CPUC will be addressing the role of the distribution company in this market, scheduling and

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[19] Although the concept of the utility has changed slightly. While Illinois has not explicitly divested the "wires" portion from the generation portion of the utility, it is often only the non-competitive services, i.e., the wires, that are included in this new concept of the utility.

[20] Also note that the IEEE–Institute of Electrical and Electronic Engineers—Standards Coordinating Committee 21 is drafting a standard that would be applied to interconnecting distributed resources with electric power systems.

[21] Recently, NARUC commissioned a report entitled "Model Utility Interconnection, Tariff and Contract Provisions for Distributed Generation," by R. W. Beck and Distributed Utilities Associates. This report can be accessed from the NARUC web site (www.naruc.org) and is largely based on the Texas model for interconnection.

[22] ComEd has implemented a program that uses a form of "net metering" to induce small volume customers to put in photovoltaic or wind resources. *See* ComEd Filing Feb. 7, 2000.

[23] *See*, Decision 99-10-065, *Opinion Regarding Distributed Generation and Electric Distribution Competition*, CPUC Rulemaking 98-12-015, at 12-14.

dispatch of DR, communications and metering, rate design and stranded costs, along with other miscellaneous issues.

Illinois has not addressed these issues in an integrated manner, generally electric utilities are left to address the issues of interconnection of non-PURPA generators,[24] including the costs of doing so, through individual utility procedures. Illinois Administrative Code Title 83, Chapter 1, Subchapter c, Part 430 sets out the general guidelines for the terms and conditions of service provided to qualifying facilities. Part 430 provides for non-discrimination in contracting, provision of timely cost estimates for interconnection (where practicable) and requires tariffs to be on file with the Commission for the compensation of energy provided from QFs. (*See* Part 430.40 and *e.g.*, ComEd's Rider 4). Generation sources other than QFs are not covered by Part 430. While many utilities have interconnection guidelines, the application of these guidelines to non-QF generation sources is generally left to the discretion of the utility. (*See* Nicor Response 4a) In addition, Section 16-118, requires utilities to allow alternative retail electric suppliers (ARES) to interconnect with utility facilities, provided such interconnection meets "established standards" and the ARES signs a contract setting forth the terms, conditions, and prices for interconnection. Section 16-118 also requires services provided to ARES that are not "competitive services" or regulated by the FERC to be provided through tariffs that are on file with the Commission.[25]

Review of Responses

This section is intended to be a brief review of the main issues raised by the responses and not a review of the responses to each question. The comments can be found on the ICC web site at http://www.icc.state.il.us/icc/el/docs.asp#com.[26] Appendix I to this report provides the original questions posed in October 1999.

Distributed Resource Definitions

Two distinct views of distributed resources were provided by the parties. The first view, espoused generally by the electric utilities,[27] is that distributed resources should be confined to electric generating units only. Unicom suggests that distributed resources (i.e., generation) should be defined as "electricity production at or near the point of use that operates in parallel with the utility's distribution system." IPC, MEC and Ameren use a similar definition. The second view takes a somewhat broader approach to DR and is typified by Enron's definition: "An electrical generating facility, electrical storage technology, or load management technology that may be connected in parallel to, or isolated from, a utility distribution system."[28] Staff supports the following as an acceptable definition of DR:

> Distributed generation and/or distributed energy resources are generation, storage, or demand side management devices, measures, and/or technologies that are connected to or injected into the distribution level of the electric transmission and

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[24] That is, non-QFs.

[25] Most entities installing DG would not likely be considered ARES under Section 16-102 of the Illinois Public Utilities Act.

[26] Several utilities also provided background material such as interconnection standards or copies of relevant tariffs on file with the Commission which do not appear on the web site.

[27] *See* Comments of Unicom, AmerenCIPS and UE, MEC and IPC. Nicor and Corn Products also appear to be in this camp.

[28] Also see Comments of Peoples, ELPC, CONI and NE and Caterpillar.

distribution grids on either the customer side or utility side of the meter or elsewhere on the distribution grid.[29]

CONI & NE (Response 1) suggest that DR should be defined as load management and DSM along with distributed generation. Generation, of any size, is "distributed generation" if it meets any of the following criteria:

a. It is located at a point below the transmission system. The transmission system may terminate at different voltages, however, in almost all cases the transmission system terminates at 138 kV or below. (TVA interconnects much of its transmission at 115 kV; other utilities define transmission as above 69 kV).

b. It is located to serve a "Retail Electric Supplier" with direct supply of electricity at an agreed upon distribution voltage. This voltage may vary based on the distribution voltage being used by the retail supplier.

c. It provides a "Co-Benefit" directly to a retail customer. In some instances this co-benefit may be thermal requirements, in other cases it may be stand-by generation.

The main differences between definitions relate to the inclusion of load management and storage-type devices and the operation of the generation (i.e., on grid or off-grid). EEI appears to fall somewhere in the middle by suggesting that DR can be defined as "any electric energy source that can provide electricity to consumers, and <u>may</u> be connected to the distribution system." EEI would include storage-type devices and both on-grid and off-grid applications but exclude load management.

In terms of the size of distributed resources, some comments suggested that generation be sized generally less than 10 MW.[30] Others suggested size is only a factor based on the location of the DR (Caterpillar) or that size limitations should not be placed on DR (Staff, Enron).[31] Other comments addressed the various sizes of DR by technology and the customers likely to use such technologies (IPC). There does not appear to be a universally accepted limit on the capacity size of DR applications. MEC suggests that the Commission should conform to the industry wide definition, when available.[32]

With respect to the applications present in Illinois, Unicom notes that nearly 100 large customers (450 MW) currently operate onsite generation units on ComEd's system. While only five smaller microturbine units (75 kW) operate in the ComEd system, Unicom notes that it plans to install 200-300 microturbines in the year 2000. IPC notes that while it does

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[29] See Staff (Response 1a). This definition was drawn from work already performed in this area by the California Public Utilities Commission (CPUC) and the California Energy Commission. See CPUC Order Instituting Rulemaking R.98-12-015, p.2, fn. 1.

[30] See Comments of EEI, MEC and Ameren.

[31] Staff notes that the Commission could institute polices that are aimed at particular capacity sizes of DR (e.g., small generating sources for residential or small commercial customer use), but favors a more even-handed approach of addressing polices for any size DR both for retail and wholesale market applications.

[32] MEC references "Working Group 1547 of the Institute of Electrical and Electronics Engineers (IEEE) Standards Coordinating Committee (SCC) 21" which "is currently drafting a standard entitled 'Standard for Distributed Resources Interconnected with Electric Power Systems'."

have some customers that have on-site generation, the market penetration of DR in its territory is limited. IPC also notes that some customers may have on-site generation that the utility does not know about. AmerenCIPS notes six customers operating generators in parallel with its system. MEC notes that a few resources on its system could be considered distributed resources. Staff attached a table to its comments listing non-utility generation stations and indicating the location, owner and the nameplate capacity. For convenience this table is attached to this report as Appendix II.

Uses, Benefits, and Drawbacks of DR

Generally either a customer or the utility can use DR in conjunction with traditional utility service or as a separate service. (*See e.g.*, Unicom, MEC, Caterpillar, IPC, Nicor). Customers may use DR to supply power and energy during peak periods or for their entire demand. Customers may also use DR as backup or standby power. (Id.) DR may also be used to provide: 1) Power and energy through the grid (either to the wholesale or retail markets); 2) ancillary services (i.e., voltage regulation, frequency regulation, spinning reserves, etc.); and 3) base load capacity additions.[33] (Caterpillar, Enron, Peoples). In addition, technologies such as power storage devices (i.e., ultracapacitors, flywheels and static VAR compensators) and new telecommunications technology[34] can be combined with DR to extract additional benefits from the deployment of DR Therefore, DR can be used as either a *supplement* to existing utility service or as a *substitute* for utility service. Currently in Illinois, customers have the following basic choices for using DR in conjunction with utility service or in place of utility service. First, a customer can leave the grid entirely and procure enough on-site generation to meet back-up needs. Second, the customer's on-site generation can used in conjunction with purchasing standby and supplemental power from the host utility at tariff rates (e.g., ComEd's Rate 18—Standby Service).[35] Third, customer may use DG along with open access tariffs. However, certain restraints on the use of traditional tariffs as outlined above may exist. For example, the use of ComEd's Rate 18 in conjunction with its delivery services rates is prevented. A customer that is using DG must take standby and/or supplemental power from ComEd under Rate PR, a negotiated rate with no established terms. Fourth, a customer may also procure power from the market, but must pay transition charges associated with supplemental and standby energy taken from the market. (Nicor Response 4b)

All the comments indicated that DR can be beneficial. (*See e.g.*, Staff, Unicom, Peoples, IPC, Enron, Caterpillar and CONI & NE) Most comments indicated that the benefits of DR are highly site and project specific. With that caveat in mind, some of the benefits noted by the parties are:

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33 DR applications may be owned by the utility or a third-party (customer, IPP, ARES, etc.). In Illinois, if a DR application provides power and energy to a retail customer, using the host utility's delivery system it must be certified as an ARES. If the host utility is charging transition charges, customers who receive ARES power and energy are liable for transition charges.

34 Telecommunications technologies promise to make local generation more "dispatchable" as utility control areas can use modern comminations technology to operate the distributed resources to maximize the benefits of those resources in the dispatching of generation.

35 Standby power is provided to cover customer load when the on-site generation is down, either due to a planned or unplanned outage. Planned outages may be a result of periodic maintenance of the on-site generator. Unplanned outages occur when the on-site generator goes down due to factors such as equipment failure, power fluctuations or control failures. Supplemental power is the difference between the customer's actual load and the power and energy produced by the on-site generator.

- cost effective use of transmission investment by avoiding higher cost transmission and distribution investment;
- mitigating existing T&D constraints;
- increase in power quality (e.g., back-up and black-start);
- efficient use of the transmission system by decreasing system losses;
- VAR source for grid stabilization;
- additional source of competitive supply for consumers;
- environmental impacts comparable or better than central station generation;

However, many parties also identified potential drawbacks, which again can be highly site and project specific. These potential problems include:

- issues with integrating DG into the grid (upgrade cost, contract and interconnection negotiation, planning);
- public safety and utility employee safety issues;
- siting or zoning issues and localized environmental issues;
- effect on utility operations;

Unicom (Response 1) notes that in assessing the drawbacks of DG there are issues related to the safe operation of the system, such as DG's impact during a short circuit.[36] Unicom avers that the installation of facilities to protect distribution equipment may be necessary, which raises issues of cost recovery. Ameren (Response 1) notes that the creation and negotiation of a parallel operating agreement for each DR facility could be time-consuming. MEC (Response 1) notes that safety issues not related to the interconnection but more to building codes (i.e., on the customer side) might be raised by applications of DR. However, Enron sees no significant drawbacks to the further commercialization of DR and the development of policies that would allow customers to access such technologies. (Enron Response 2) CONI & NE note that revisions must be made to utility operating procedures, but that this is not a technical "drawback." (CONI & NE Response 3). ELPC notes that the encouragement of "dirty" fuel use in DR could make it more difficult for Illinois to meet Federal air quality standards. (ELPC Response 1) Some of these issues raised by parities are technical in nature and can be overcome by careful adherence to electric operation standards. Other issues will need to be addressed as DR is more often deployed on a utility system. (*See e.g.*, Unicom, Ameren, MEC, Caterpillar).

Transmission Loading Relief

One key benefit that DG promises is the relieving of transmission congestion. Most comments indicated that distributed generation could be used for transmission loading relief. (*See*, e.g., Staff, Unicom, IPC, Enron, Caterpillar) If the generation is dispatchable and reliable, DG can be effective at relieving transmission constraints when strategically located on the grid. As noted above, new telecommunications technologies can provide greater control over customer-owned generation permitting the utility to dispatch for purposes of

[36] Short circuits in the distribution lines can be caused by a line coming in contact with the ground thereby causing unplanned power flows.

system control. (Unicom) Incorporating DG into the planning process for the grid may provide benefits in the form of avoided T&D investment and reductions in the load on current T&D facilities. Unicom states that such resources may have an impact on the utility's planning process, but that not all DG projects will produce benefits. MEC cautioned that delivery system should continue to be designed to meet the needs of delivering energy to non-interruptible customers. (MEC Response 1) IPC suggest that it has identified circuits that could benefit from DG, but uncertainties concerning the operation of such facilities along with the lack of a clear mechanism to place DG at critical sites make a DR solution hard to implement at this point. Further, the requirement for a certificate of public convenience and necessity may discourage the use of DR by a utility to avoid T&D investment or to upgrade the distribution system. IPC also indicates that individual customer motivations for installing DG makes their use in system planning somewhat more difficult. (IPC Response 1, 3, 5) Ameren notes several potential situations in which DG would not be effective for loading relief and may, in fact, exacerbate the situation. First, upgrades to feeders may be needed to accommodate DG. Second, providing power to a substation that has both transmission in and out could cause loading problems. Third, during minimum loading conditions voltage can climb; therefore the addition of DG could exacerbate the problem. (Ameren Response 1)

Enron points out that incorporating DG into the planning process is appropriate, but the Commission needs to be cognizant of the role utilities play in permitting access to the gird and controlling where DG can be located on the grid. Enron avers that if utilities are allowed to completely control the expansion and upgrade of the T&D system, the full benefits of DG may never be realized. (Enron Response 1) Caterpillar suggests that a utility could be provided incentives (i.e., compensation) to incorporate DG into its planning function. Caterpillar also notes that bidding out projects may be the most cost-effective manner to ensure that the appropriate technical, economic and environmental resources are deployed. (Caterpillar Response 2)

Role of the Commission

Parties generally fall in two categories as to the role of the Commission in this market. One group, generally represented by the electric utilities, feels the Commission should either play no role or a very limited role, especially in promoting DR. (*See e.g.*, Unicom, Ameren, MEC). The second group, generally DR suppliers and ARES, suggests the Commission should have some role to play in facilitating this market. (*See e.g.*, Caterpillar, Enron, Peoples, Nicor) However, most of these parties fell short of suggesting that the Commission should *promote* the use of DR. For example, Staff indicates its preference for the Commission to focus on removal of the artificial barriers to DR that might currently exist, without resorting to subsidizing DR applications. (Staff—Introduction) Others take a broader approach to the Commission's role. CONI & NE suggests that that Commission take an "aggressive" role to open up the market and promote DG technologies. (CONI & NE Response 3) MWD suggests that the Commission should "promote" those DRs that provide support to the grid during peak periods and that "special consideration" should be provided to environmentally friendly applications. ELPC suggested that the Commission promote the use of "net-metering" to facilitate implementation of environmentally friendly DRs. (ELPC Response 3) Peoples suggests that the Commission "make recommendations to the General Assembly" to provide incentives or tax savings to customers for implementing DR. (Peoples Response 3)

Comments Supporting a Limited Role for the Commission

Unicom avers that the DG market is working well and has for many years. Unicom points to ComEd's interconnection guidelines as an indication that ComEd is facilitating the growth of the DG market in its territory. However, Unicom also suggests that the Commission does have two limited roles in this market. First, the Commission should increase the awareness and understanding of DG through procedures such as this request for comments. Unicom adds that this is the "single greatest contribution" the Commission can make to the expansion of this market. Second, Unicom suggests that the Commission should play the role of "gatekeeper" by minimizing efforts to use the regulatory process for market advantage. Unicom is opposed to any rulemaking or regulatory proceeding, suggesting that current market relationships are built on "trust" that a regulatory proceeding would likely destroy. It is further opposed to any technical standards being imposed by the Commission, arguing that all entities, including the utility, need "flexibility" to respond to changing technologies. Ameren suggest that the Commission should focus on reliability and "fair treatment" of DR stakeholders and should have no role in promoting DR. Ameren also suggest that any "one-size-fits-all" approach would not be appropriate as utility systems and costs differ. MEC suggests that the Commission should involve itself in the IEEE interconnection process as a method of developing common interconnection standards.

Comments Supporting a More Active Role for the Commission

Many of the comments suggesting a more active role for the Commission focused on several issues. First, nearly all parties advocating a role for the Commission cite interconnection standards and procedures as a top priority.[37] Nicor contends that allowing the incumbent electric utilities to control the application of interconnection standards causes unreasonable delays, project costs and discourages cost-effective applications. (Nicor Response 4) Peoples argues that a "review and reassessment" of interconnection procedures is necessary. (Peoples Response 3) Enron suggests that current interconnection standards are out-dated and designed for the vertically integrated industry structure. (Enron Response 3) Caterpillar suggests that the Commission could wait for the IEEE standards to be published, but since many technologies are currently available for commercial use, an interim set of standards should be adopted this year. (Caterpillar Response 3) Staff suggests that standardized interconnection requirements would facilitate deployment of DR by relieving administrative burden and would also provide protections against anti-competitive actions on the part of the host utility.[38] (Staff Response 3e) EEI suggests that the Commission should only step in to create interconnection standards if they fail to materialized from the "competitive market." EEI, however, recognizes that the IEEE process may take up to two years to provide a workable set of interconnection standards and that the Commission should determine if, on an interim basis, "market-based" standards are needed. EEI also recognizes that greater uniformity in interconnection-related tariffs may be desirable, but that the costs are likely to vary by utility.(EEI, Response 3.) IPC suggests that when the IEEE interconnection standards are available, it will consider adoption of those standards.(IPC, Response 4.)

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[37] *See also*, Corn Products, CONI & NE, and ELPC responses to questions 3 and 11.

[38] However, Staff notes that it does not support limitations being placed on the size of DR in order to accomplish the goal of standardized interconnection arrangements.

Second, some comments addressed issues related to tariffs. Nicor notes that many of the provision of standby and supplemental energy tariffs are discouraging to DG. Further Nicor states that combining DG with open access tariffs is also discouraged by the application of transition charges to the delivery services portion of the customers bill. (Nicor Response 4b) Enron notes that one of the most pressing issues, along with interconnection, are the “artificially high” backup rates. (Enron Response 3) EEI suggest that standby tariffs may need to be updated to reflect the performance of current DR technologies. (EEI, Response 3.) CONI & NE, and Enron note that tariffs issues such as sending time-differentiated price signals and curtailable and interruptible tariffs are also ripe for discussion. (CONI & NE and Enron responses to question 3.)

Finally, a variety of other issues were raised by comments. Nicor notes that the incumbent utility’s linking of commodity power sales with the “wires” service may provide an incentive for the electric utility to use competitively sensitive information to thwart potential bypass situations. (Nicor Response 4c) Enron, notes that the utility control over the distribution system provides a natural barrier to effective implementation of DR.(Enron Response 5,6 and 7) IPC notes that the incumbent does exercise control over its system for operational and reliability reasons, but suggests that guidelines could be developed for how, when and where DR may be used on the grid. (IPC, Response 7.) Staff notes that since the utility has control over interconnection, it could discourage the deployment of DR. Staff, however, believes that parties have recourse to the Commission for review of such matters. (Staff Response 7.) Additionally, Staff points out the dispatching, scheduling and balancing rules may be problematic for DR. (Staff Response 3c) MEC notes that after the transition period the delivery services provider should not own DR unless it can be shown that no third-party supplier is willing to install DR to provide system support. (MEC Response 8)

Recommendations for Commission Action

Recommendations for Commission action range from a “let the market work” approach to a more active Commission role. One of the common recommendations is for the Commission to initiate either an Notice of inquiry (NOI) or a rulemaking to address DR issues. Nicor suggests that the Commission address six issues related to interconnection, tariffs and alternative dispute resolution (ADR). (Nicor, Conclusions and Recommend(ed) Actions.) Nicor would have the Commission open either a NOI or a rulemaking following two paths. The first would address interconnection and Alternative Dispute Resolution (ADR) and the second would address tariff issues. (Id.) Enron suggests the Commission also follow a bifurcated path. First, a rulemaking proceeding should be opened to established interconnection standards and rules that would apply to DR less than 50 MW. Second, a second rulemaking should be opened to address other issues such as rate design and issues related to larger scale DR. (Enron, Response 3.) Peoples suggests that the Commission should take the following actions: 1) establish uniform T&D interconnection standards for DG implementation; 2) allow electric utilities to provide incentives for implementation of DG/DR applications; 3) make recommendations to the General Assembly concerning incentives for DR; and 4) establish rules and clearly defined policies that would prevent electric utilities from discouraging DG/DR. Peoples suggests that a docketed proceeding utilizing a workshop process could be used to address certain of these issues. (Peoples, Response 3 and 11) ELPC suggests that an NOI would be appropriate to identify and evaluate how to remove barriers to development of cost-effective and environmentally preferable DR.(ELPC, Response 11) Other parties such as CONI & NE argue that issues related to the ownership of DG should be addressed along with promoting common interconnection standards. Caterpillar notes that issues other than interconnection and tariff issues may need to be addressed. For example, Caterpillar suggests that the Commission investigate potential market power in emission reduction credits markets and the availability of such credits for DR. (Caterpillar, Response 11)

Conclusion

All of the parties appear to recognize the potential benefits of some forms of DR. Many of the parties also recommend that the Commission play a greater role in assuring that this market develop in a rational manner. Issues related to interconnection appear to be on the top of the list for those proponents of Commission action. However, other issues related to tariffs for standby/supplemental power, ownership of DR and transmission and distribution planning including DR also appear to be of interest to some parties.

The Electric Policy Committee, through its Chair, would like to thank the parties for addressing these important issues. The answers provided to these questions will help forge the debate as the Commission begins to informally, and possibly formally, review these issues. The next step in this process will be to convene two Electric Policy Committee meetings in the Spring of 2000.[39] The Committee will be inviting experts in the field to provide further details related to the deployment of DR and the public policy issues related to DR. Some interested parties will also be given the opportunity to present their viewpoints on what the next step in this process, if any, should be.

[39] These Electric Policy Committee meetings have been formally noticed. The notices are posted on the ICC web site (www.icc.state.il.us).

APPENDIX I

Notice of Questions on Distributed Resources from Commissioner Terry S. Harvill
Chair of the Electric Policy Committee
Illinois Commerce Commission

As of October 1, 1999 certain customers have the opportunity to choose their electricity suppliers and by the early part of the next decade all customers will have the opportunity to choose alternative sources of supply in Illinois. Competition in the electric industry promises to provide new products and services. The Commission's role in this process is to promote the opening of these new markets so a varied array of products and services can be provided in an efficient manner. The Commission has unbundled delivery services from generation services and is currently in the process of unbundling delivery services (ICC Docket No. 99-0013).

While some customers have chosen alternative suppliers, other customers have shown an interest in distributed resources (e.g., small scale generation). As this past summer reminds us, for electric supply to be reliable, the transmission and distribution grid must also be reliable. Distributed resources can be used in a number of ways to provide value-added services in addition to power and energy as well as playing a role in maintaining the reliably of supply. It is therefore important to understand the issues surrounding distributed resources not only because they provide customers with additional choices, but also because they may represent a potential reliability enhancing measure.

The following questions are designed to provide the Electric Policy Committee with the necessary background to begin the discussion of distributed resources and their role in the electricity market in Illinois. After the comments are filed, the Committee will put together a series of meetings related to this issue. As a practical matter, not all parities wishing to address the Committee on these important issues will have the opportunity to do so. The responses to these questions will provide one forum for those parties to have their opinion heard. Parties need not address all questions and are welcome to provide the Committee with additional relevant comments. Please send all comments via e-mail to Carl Peterson (cpeterso@icc.state.il.us). The deadline for comments is December 15, 1999.

1. Please provide an <u>exact</u> definition of a distributed resource (DR). For example, is a distributed resource only small scale generation? If so, of what size? Should DSM services also be included in the definition?
    - How can DR be used either in conjunction with traditional utility service or as a stand-alone service to meet customers' demands?
    - Can DR be effective in providing loading relief for transmission and distribution systems?
    - Should DR be considered when planning for and expanding the T&D system?
    - What new technologies can be used in conjunction with DR to lower costs and improve service?
    - Are there any other benefits from DR (e.g., environmental)?
    - What are the drawbacks of DR (e.g., utility operations, public health and safety, etc.)?

Please include examples of currently deployed distributed resources either in Illinois or other jurisdictions and explain exactly what services (or value) these resources provide. (If providing examples of DR outside of Illinois, please indicate any unique features of the regulatory or legal environments of that jurisdiction that differentiate it from Illinois as it pertains to DR.)

2. What is the market penetration for DR in Illinois (include self-generation and co-gen if not included in your definition provided in question 1)?
3. What should the Commission's role, if any, be in promoting this market? If the Commission should have a role, please provide an outline of actions the Commission can take along with a timetable.
    - How does the manner in which the Commission has unbundled delivery services from generation services impact the cost-effective application of distributed resources?
    - What aspects of current delivery service rate design should be altered to facilitate the cost-effective deployment of DR?
    - Should delivery service rates be geographically differentiated to provide the appropriate price signals to locate DR in areas that need distribution upgrades?
    - Should the Commission develop a common set of interconnection rules/tariffs for the state?
    - What other changes in legislation, rules, tariffs, unbundling polices and interconnection practices are needed to facilitate the deployment of cost-effective distributed resources?
4. What are the requirements in terms of metering, metering standards, data control and management, communications and utility operations for the central dispatch of distributed resources? (Please provide a summary of the assumptions made concerning the distributed resource technology, the structure of the electricity market and the nature of the distribution system used to formulate your answer)
5. What aspects of past distribution planning and deployment hinder the development of the DR market? Are there specific areas on any utility's system that are particularly problematic for DR? What actions can the Commission take to alleviate any perceived problems?
6. Do the incentives currently inherent in the regulation of the incumbent electric utilities hinder or facilitate the cost-effective application of distribute resources by alternative suppliers? Please explain. If the current structure hinders efficient deployment, what changes are needed?
7. Does the incumbent utility have any market power associated with planning, leasing or dispatching DR? Is this any different from central station generation? Can that market power be mitigated? How?
8. What other issues or problems arise from the incumbent utility owning, operating and deploying DR?
9. How is the natural gas industry impacted by DR? Is there a need for changes in the rules, practices, tariffs or market structure to facilitate the cost-effective application of DR?
10. How does the deployment of DR impact competition for the <u>delivery</u> of power and energy?

Please provide any additional comments (you may include procedures for the Commission to address any issues that are of concern.).

APPENDIX II

Table 24. Existing Capacity at U.S. Nonutility Power Producers
BY STATE, OWNER AND FACILITY, AS OF DECEMBER 31, 1998 (Attached to Staff's Comments)

Owner/Facility	Nameplate Capacity (megawatts)
Kincaid Generation L. L. C.	0.0
A E Staley Manufacturing Co Decatur Plant Cogen	62.0
Alpharma Incorporated	3.3
Amoco Research Center Cogeneration Facility	8.3
Archer Daniels Midland Co	
Chicago	2.6
Clinton	31.4
Decatur	261.0
Galesburg	3.0
Peoria	64.0
Steger	1.0
Taylorville	4.6
Armour Pharmaceutical Company Centeon L L C	4.3
Art Institute of Chicago	1.5
Bio Energy Partners Greene Valley Gas Recovery	6.0
Bio-Energy Partners	
CID Gas Recovery	9.0
Kankaee County Landfill Gas Recovery	1.6
Lake Gas Recovery	12.0
Milam Gas Recovery	2.4
Settler"s Hill Gas Recovery	3.9
Tazewell Gas Recovery	1.6
Woodland Landfill Gas Recovery	1.6
Board of Education, Evanston Township High School District 202	2.4
Browning-Ferris Gas Serv Inc	
Mallard Lake Generating Facility	20.4
Modern L/F Generating Facility	2.9
Rockford Generating Facility	2.0
Waukegan Generating Facility	3.0
Bunge Foods	3.8
City of Kankakee Hydroelectric Facility	1.2
Corn Products International -Illinois	59.5
Cyprus Rod Chicago, Inc.	2.3
CGE Ford Heights, LLC CGE Waste Tires to Energy Project	23.5
Dixon Marquette	14.1
Duraco Products, Incorporated	1.6
DuPage Co Environmental Region 9 West Wastewater Treatment	1.5
Fox Metro Water Reclamation District	2.2
FSC Paper Co/Wisconsin Tissue Alsip Paper Condominium Association	8.6
General Mills, Inc. - West Chicago	6.6
Hoffer Plastics	7.2
Tim Huey Corporation(DBA) - Huey Forest Products	3.0
Hydro-Op One Associates Dayton Hydro	3.6
Ingersol Milling Machine Company	4.9
Interstate Brands Co Chicago Baking Co	1.1
IMC Nitrogen Co. Imc Nitrogen Co	3.5
IVEX Corporation IVEX Corporation	3.8
Jacobs Energy Corporation	5.7

APPENDIX II

Table 24. Existing Capacity at U.S. Nonutility Power Producers
BY STATE, OWNER AND FACILITY, AS OF DECEMBER 31, 1998 (Con't)

Owner/Facility	Nameplate Capacity (megawatts)
Jefferson Smurfit Corporation (U.S.)	12.5
John Deere Harvester Works	10.0
Klein Tools Incorporated - Chicago	1.6
Koppers Industries Inc Chicago Plant	7.5
KMS Bakery Power Partners L P Entenmann's Co-Generation Facility	1.6
Lauhoff Grain Company	20.0
Little Company of Mary Hospital	4.0
LTV Steel-So. Chicago Works	9.5
M&M/Mars Inc.- Chicago	3.5
Illinois Marathon Oil Co Illinois Refining Division	12.0
Marcap Corporation IIT Cogeneration Facility	8.0
Metro Water Reclamation Lockport Powerhouse	13.5
Mobil Oil Corp Joliet Refinery	39.6
Moose International Power House	2.0
MWRD: Stickney Water Reclamation Plant	3.0
Nalco Chemical Company	4.7
Northern Illinois Gas Company	2.6
Panduit Corporation - Tinley Park	1.5
Pekin Paperboard Company L/P	1.5
PPG Industries, Incorporated - Works 14	4.8
Resource Technology Corp	
Biodyne Congress	4.3
Biodyne - Pontiac	1.8
Biodyne-Lansing	2.2
Biodyne-Lyons	4.5
Biodyne-Peoria	4.3
Biodyne-Springfield	3.3
Shell Wood River Refining Company	20.0
Sherman Hospital	1.6
Sisters of Holy Family Saint Mary of Nazareth Hospital Center	2.4
Sisters of Resurrection Hospital	1.5
Solutia INC. W. G. Krummrich Plant	6.4
St Francis Hospital	1.6
Star-Kist Foods Inc Gaines Pet Foods Corp	3.2
STS HydroPower Ltd Dixon Hydroelectric Dam	3.0
Illinois Thornton Twnshp Schl Dist 205	1.1
Thornwood High School	1.5
Trigen-Peoples District Energy Company	3.3
Abbott Power Plant-Univ of IL/Urbana-Champaign	30.0
University of Illinois Co-Generation Facility	13.0
Village of Robbins Resource Recovery Facility	55.3
Viskase Corp Chicago East Plant	4.9
Warner-Lambert Company - Rockford	4.8
Wells Manufacturing Company-Dura-Bar Division	6.3